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Children oral health and parents education status: a cross sectional study

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Abstract

Introduction Oral diseases are common and affect millions of people worldwide. They can range from mild and easily treatable conditions to more severe and serious diseases. Proper oral hygiene and regular dental monitoring are essential for maintaining good oral health. When it comes to children's health and well-being, parents' education level plays a critical role. Research has shown that parents' higher educational attainment is associated with better health outcomes for their children.

Our aim is to evaluate whether parents' education level and employment influence children oral health and its impact on the family.

Methods We enrolled consecutively healthy subjects aged between 0–16 and their parents at the Dental Clinic of the University of Campania "L. Vanvitelli". The Italian version of the ECOHIS (I-ECOHIS) was administered to parents of the enrolled subjects referred to the Dental Clinic of the University of Campania "L. Vanvitelli". Linear regression models, adjusted for age and sex, were used to explore the association between parents' employment or education level and the ECOHIS scores. Statistical significance was accepted when p value < 0.05 .

Results We found a significant association of a higher I-ECOHIS total score (coeff. 4.04244; CI 95%: 1.530855–6.554026; $p=0,002$) and higher I-ECOHIS children section score (coeff. 3.2794; CI 95%: 1.29002–5.268; $P=0,002$) and the father unemployed status.

We also found that a higher education level of the father was associated with a lower ECOHIS total score (coeff. -1.388; IC 95%: -2.562115—-0.214 $p=0.021$) and a higher education level of the mother was associated with a lower ECOHIS in children section (coeff. -0.972; IC95%: -1.909356—-0.034; $p=0.042$).

Conclusions Father unemployed status and a lower educational level for both parents may negatively affect oral health status.

Keywords Early Childhood Oral Health Impact Scale (ECOHIS), Oral health, Children, Educational level, Employee status, Dentistry

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Introduction

Oral diseases are common and affect millions of people worldwide. They can range from mild and easily treatable conditions to more severe and serious diseases. Proper oral hygiene and regular dental monitoring are essential for maintaining good oral health [1–4].

The most common oral diseases are cavities, gingivitis, periodontal disease and temporomandibular disorders [5]. Proper oral hygiene is essential in preventing and treating these conditions. Brushing and flossing regularly help remove plaque and bacteria from the teeth and gums. Early detection and treatment of oral diseases can help prevent more serious complications.

The Early Childhood Oral Health Impact Scale (ECO-HIS) is a questionnaire to elucidate the correlation between parental perceptions of the quality of life of their preschool children and their oral health status [2, 5–8].

Early Childhood Oral Health Impact Scale (ECOHIS) is a tool designed to measure the impact of oral disease on the quality of life of children. The scale was developed by the World Health Organization and the International Association for Dental Research. The main advantage of the ECOHIS is that it provides a comprehensive assessment of a child's oral health. It allows for the identification of oral health issues early on before they become more serious and potentially more difficult to treat. Therefore, it can be considerable as a very sensitive tool [2, 8].

Decayed, missing and filled dental treatments are an important part of overall oral health. They are essential for preventing the onset of more serious dental issues such as gum disease, tooth decay, and tooth loss. Tooth loss is the most important cause of prosthesis [9–16]. Decayed teeth occur when bacteria and plaque buildup on the teeth, leading to a weakened enamel. This can be treated with a filling, which is a material that is inserted into the cavity to replace the damaged enamel. Filling materials come in a variety of forms, including composite, silver amalgam, and gold [17–20].

When it comes to children's health and well-being, parents' education level plays a critical role. Research has shown that parents' higher educational attainment is associated with better health outcomes for their children. This is likely since parents with higher educational attainment are more likely to have the knowledge, resources, and access to health care that are necessary for promoting optimal health for their children [21]. Parents with higher levels of education are more likely to have the knowledge and skills necessary to effectively communicate with their children about the risks associated with certain behaviors. They are also more likely to be able to provide their children with the resources and support they need to stay safe and healthy. Finally, parents with

higher levels of education are more likely to have the financial resources necessary to ensure that their children have access to quality education and health care. This, in turn, can lead to better overall health and well-being for children, which can further reduce their likelihood of engaging in risky behaviors.

Oral diseases have a multi-factorial etiology. The socio-behavioral and environmental factors play a key role in oral health. Many epidemiological studies have revealed that differences in socio-economic status influence oral health. Indeed, the prevalence and severity of oral pathology vary within and between countries depending on socio-economic status [21–24].

Further, a recent systematic review found that school-based oral health promotion programs generally had positive effects on children and adolescents. These programs, conducted in preschools, elementary schools, and high schools, led to improved oral health knowledge, behaviors, status, and quality of life. The study emphasizes the effectiveness of these initiatives, particularly when involving children, teachers, and parents.

Our aim is to evaluate whether parents' education level and employment influence children oral health and its impact on the family.

Methods

The study was conducted in accordance with the Declaration of Helsinki, and the protocol was approved by the Ethics Committee of the Institute, University of Campania *Luigi Vanvitelli* [Protocol number: #555/2017; Date: 05/10/2017]. The study protocol was developed, and all subjects gave their written informed consent for inclusion before they participated in the study.

We enrolled consecutively healthy subjects aged between 0–16 and their parents at the Dental Clinic of the University of Campania "L. Vanvitelli".

The Italian version of the ECOHIS (I-ECOHIS) was administered to parents of the enrolled subjects referred to the Dental Clinic of the University of Campania "L. Vanvitelli", regardless of age, June and December 2018, in order to evaluate oral health status parents' perception of their children oral health status. The Italian version was already validated in subjects aged between 0–16 years as a reliable measure of oral health in a previous study. As the original version, the I-ECOHIS is composed by 13 items divided into two domains: 9 questions explore the impact on children and the 4 the impact on parents.

Inclusion criteria: subjects aged between 0–16 years, availability to fill the questionnaire by children and their parents.

Exclusion criteria: concomitant pathologies of any order and type, to avoid bias due to health status related to other affections than the oral ones.

An operator involved in the study was present during the questionnaire administration in order to help and record the comprehensibility reported by each parent. According to Pahel et al., the I-ECOHIS answers were coded as follows: 0=never; 1=hardly ever; 2=occasionally; 3=often; 4=very often; 5=don ‘t know, and the total scores were calculated as a simple sum of the response codes for the child and family sections separately, ranging from 0 to 36 and 0 to 16, respectively.

We also collected data regarding parents’ employment status and parents’ education level.

Sample size

An initial statistical evaluation of sample size was performed considering (I) a power of 95%, (II) two-tailed analysis and significance level of 1% (to correct for multiple comparisons), (III) the mean of the total ECHOIS scored by children with employed father (7.98 ± 4.26) and the mean of the total ECHOIS scored by children with unemployed father (10.4) obtained from a population of 43 patients (our preliminary results). This analysis suggested a minimum sample size of 81 individuals per group.

Statistical analysis

Continuous variables were expressed as mean and standard deviation (SD) or median with range. The prevalence of categorical variables was expressed as a number and percentage.

The outcomes were I-ECOHIS total score, I-ECOHIS children section and I-ECOHIS family section. The outcome variables were considered as continuous variable.

Parents’ employment and educational level were used as predictors. Employment was treated as binary variable (presence or absence of employee at the time of questionnaire administration. Educational level was treated as an

ordinal variable: 1, elementary school license, 2, middle school diploma, 3, diploma, 4, degree.

Mann–Whitney test was used to compare mean I-ECOHIS levels between children with employed or unemployed parents. Linear regression models, adjusted for age and sex, were used to explore the association between parents’ employment or education level and the ECOHIS scores.

Statistical analyses were performed using Stata Statistical Software (Release 16, StataCorp LLC, College Station, TX, USA). Statistical significance was accepted when *p* value < 0.05.

Results

The questionnaire was administered to 184 consecutive Italian-speaking parents/caregivers, irrespective of children age (age range, 2–16 years; mean age, 7,84 ± 3,23 years). 85/184 (46,19%) were male.

The mean I-ECOHIS in the whole population was 9,68 ± 6,53; the mean I-ECOHIS child section was 6,84 ± 5,1; the mean I-ECOHIS family section was 2,91 ± 3,28. The higher I-ECOHIS total score calculated was 24/50, while the higher “child section” and “family section” scores reported were 20/35 and 13/15 respectively. More details in Table 1.

When we compared the I-ECOHIS and I-ECOHIS sections between children with employed father with those with unemployed father, we found that children with employed father present a lower total ECOHIS score (8.92 ± 5.96 vs 12.96 ± 7.50; *p* = 0,0087), lower I-ECOHIS children section score (6.237 ± 4.53 vs 9.51 ± 6.65; *p* = 0.019) and a slightly lower, not significant, score in I-ECOHIS family Sect. (2.75 ± 3.23 vs 3.44 ± 3.15; *p* = 0.17).

Conversely, we did not find any difference in the I-ECOHIS score and I-ECOHIS section scores between

Table 1 Results of the questionnaire

	Children (184)	Father (180)	Mother (181)
Age (mean, ds)	7,84 ± 3,23	-	-
Female sex (n, %)	85 (46,19%)	-	-
Unemployed (n, %)	-	17,8%	68,8%
Educational level. years (n, %)	Elementary school certificate	-	6,67%
	Middle school certificate	-	46,67%
	High school diploma	-	33,89%
	College degree	-	12,78%
I-ECOHIS (mean, SD)	9,68 ± 6,53	-	-
I-ECOHIS child section (mean, SD)	6,84 ± 5,1	-	-
I-ECOHIS family section (mean, SD)	2,91 ± 3,28	-	-

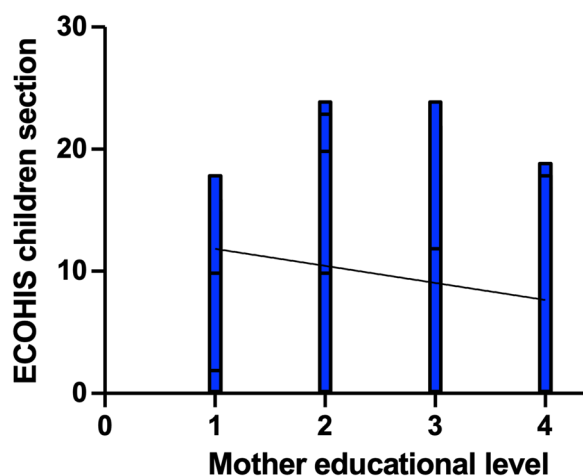


Fig. 1 Graph on the level of mother’s education

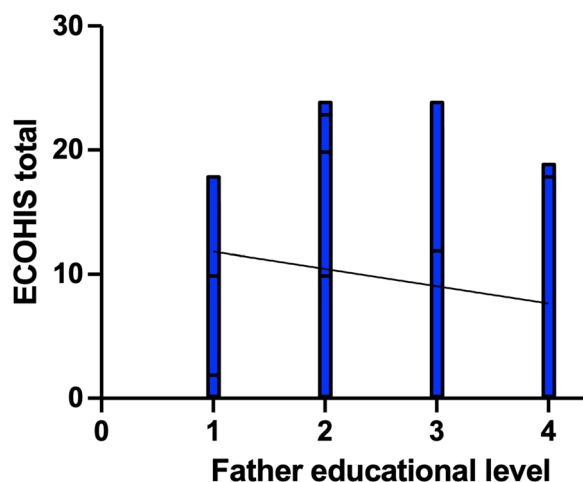


Fig. 2 Graph on the level of father’s education

children with employed mother with those with unemployed mother.

At the regression models, we found a significant association of a higher I-ECOHis total score (coeff. 4.04244; CI 95%: 1.530855–6.554026; $p=0,002$) and higher I-ECOHis children section score (coeff. 3.2794; CI 95%: 1.29002–5.268; $P=0,002$) and the father unemployed status.

We also found that a higher education level of the father was associated with a lower I-ECOHis total score (coeff. -1.388; IC 95%: -2.562115–-0.214 $p=0.021$) and a higher education level of the mother was associated with a lower I-ECOHis in children section (coeff. -0.972; IC95%: -1.909356–0.034; $p=0.042$). The regression models exploring the association between educational level and ECOHis score are depicted in Figs. 1 and 2.

Discussion

In this study we have evaluated whether parents’ educational level and employment status influence the oral health condition of their children.

We found that an unemployed status for the father and a lower educational level for both parents may negatively affect oral health status [18, 19, 25].

There is a clear relationship between parents’ educational level and their ability to prevent their children from being involved in risky behaviors. Studies have shown that children of parents with higher levels of education are more likely to avoid risky behaviors than those whose parents have lower levels of education. There are several reasons why this relationship exists. First, parents with higher levels of education are more likely to have the knowledge and skills necessary to effectively communicate with their children about the risks associated with certain behaviors. They are also more likely to be able to provide their children with the resources and support they need to stay safe and healthy. Finally, parents with higher levels of education are more likely to have the financial resources necessary to ensure that their children have access to quality education and health care. This, in turn, can lead to better overall health and well-being for children, which can further reduce their likelihood of engaging in risky behaviors.

Research has shown that children of parents with higher levels of education have lower rates of obesity and childhood asthma. This is likely due to the fact that parents with higher levels of education are more likely to have the knowledge and resources to ensure their children are eating nutritiously and exercising regularly [26–30]. They are also more likely to have access to health care resources that can help diagnose and treat asthma, as well as access to preventative preventive health care, such as preventive treatment and regular check-ups. In addition, research has shown that children of parents with higher levels of education are less likely to be exposed to environmental hazards, such as air pollution or lead-based paint [18, 31, 32]. Parents with higher levels of education are more likely to be aware of environmental hazards and take steps to reduce their children’s exposure to them. Finally, research has shown that children of parents with higher levels of education are more likely to receive appropriate mental health care and treatment. Parents with higher levels of education are more likely to recognize the signs and symptoms of mental health issues [5] and access appropriate care and treatment for their children [26–28]. Overall, parents’ higher educational attainment is associated with better health outcomes for their children. Parents with higher levels of education are more likely to have the knowledge, resources, and access to health care that are necessary for promoting optimal

health for their children. Moreover, they are more likely to be aware of environmental hazards and take steps to reduce their children's exposure to them, as well as recognize the signs and symptoms of mental health issues [5] and access appropriate care and treatment for their children [5, 19, 20, 33].

Oral diseases have a multi-factorial etiology. The socio-behavioral and environmental factors play a key role in oral health. Many epidemiological studies have revealed that differences in socio-economic status influence oral health. Indeed, the prevalence and severity of oral pathology vary within and between countries depending on socio-economic status [21–24].

In numerous Asian and African countries poor oral health is unequally distributed, with a higher prevalence of oral pathology in socially disadvantaged communities [34].

Edelstein reviewed numerous national surveys exploring oral health of children between 2–4 years and 6–8 years. He found that children of parents with less than high school education had the highest caries experience compared to children of parents with higher education levels [35–37].

Another study found that children that children who had parents with <8 years of education experienced higher levels of caries than the children of more educated parents [38].

These findings are in line with the results of our study. Herein, we found that a lower educational level of both parents is associated with a higher likelihood of presenting oral health issues. The association between the unemployed status of the father and the higher scores at ECOHIS could be indirectly linked to the relationship that occurs between a lower educational level and an unemployed status.

Understanding oral health and educational backgrounds can be complex due to various factors. Diagnosing oral health issues often relies on subjective patient descriptions, which may not always accurately convey the severity of symptoms. Limited access to dental care, especially among disadvantaged groups, can result in delayed diagnoses, allowing conditions to worsen. Diagnosing oral problems in children can be challenging due to their limited ability to communicate symptoms effectively. Furthermore, oral diseases often manifest subtly initially, making them difficult to detect without comprehensive examinations. Dental anxiety and fear can deter patients from undergoing necessary assessments, further complicating diagnosis. Assessing a patient's educational level can be equally challenging. Many patients lack formal education documentation, and language barriers can hinder accurate assessments, especially in multilingual settings. Patients may not always provide precise

information about their educational history, and limited literacy skills can affect their ability to convey their background accurately. Non-standard educational forms, cultural norms, and privacy concerns add further complexity to evaluating educational levels. To navigate these challenges, healthcare providers must adopt patient-centered and culturally sensitive approaches, ensuring effective communication and trust-building to facilitate accurate diagnoses and educational assessments.

The persistence of oral health inequalities demands preventive efforts toward communities at higher risk, through policies that are both proportionate (targeting the least advantaged) and universal (accessible to all). In this direction, the increasing cost and inequitable access to quality healthcare, coupled with the merger of the information technology [39] and health service sectors, has given rise to the modern field of telemedicine [40, 41]. The use of telecommunications technology to exchange dental information between distant locations in order to provide dental care or consultation is termed 'teledentistry'. This mode of delivery of dental care has been found to be feasible, efficient and cost effective. It provides an opportunity to reach out to patients in remote and underserved areas. Telemedicine is the use of telecommunications technology to exchange medical information between distant locations in order to provide healthcare services. Teledentistry is a subspecialty of telemedicine that involves the use of telecommunications technology to exchange dental information between distant locations in order to provide dental care or consultation. The use of teledentistry has been found to be feasible, efficient and cost effective. It provides an opportunity to reach out to patients in remote and underserved areas. A study conducted by the American Dental Association found that patients who used teledentistry services were highly satisfied with the care they received. The study also found that teledentistry is a cost-effective way to provide dental care [42]. Telemedicine is therefore receiving more attention as a potential healthcare delivery alternative, particularly for chronic illnesses.

Limitations

It's important to acknowledge some limitations of the present report. Firstly, this study is observational in nature, which means it can establish associations but not causation. Secondly, the study was conducted in a specific geographical area and may not fully represent broader populations. Additionally, the study relied on self-reported data from parents, which could introduce response bias. Further research with larger and more diverse samples, as well as longitudinal designs, is needed to confirm these findings and explore potential causal relationships. Moreover, the study did not consider other

potential confounding factors that could influence oral health, such as dietary habits and access to dental care. Finally, the impact of teledentistry on addressing oral health inequalities, mentioned in the discussion, warrants further investigation to assess its feasibility and effectiveness in different contexts.

Conclusions

In conclusion, this study found that parental education level and employment status significantly influence their children's oral health. Children with employed fathers had lower oral health impact scores, while lower parental education levels correlated with higher oral health burdens. These findings reinforce the role of education and employment in guiding children away from risky behaviors and ensuring access to healthcare.

Oral diseases have complex causes, often tied to socio-economic factors. Disparities in oral health persist among different communities, emphasizing the need for targeted healthcare policies. Telemedicine, including teledentistry, holds promise in bridging healthcare gaps.

In summary, this research underscores the importance of parental socio-economic factors in children's oral health outcomes. Comprehensive healthcare policies, along with innovative approaches like telemedicine, can help reduce disparities and improve the well-being of children from diverse backgrounds.

Abbreviations

ECOHIS	Early Childhood Oral Health Impact Scale
WHO	World Health Organization
I-ECOHIS	Italian version of the Early Childhood Oral Health Impact Scale
SD	Standard Deviation
CI	Confidence Interval

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Not applicable.

Authors' contributions

Conceptualization MDB, VR, MC; methodology MDB, VR, MC; software, GM, RF, MMM; validation, MDB, VR, MC; formal analysis, GM, RF, MMM; writing—original draft preparation, GM, RF, MMM; writing—review and editing, GM, RF, MMM; visualization, MC, MDB, VR; supervision, GM, MC; project administration, MDB; funding acquisition, MDB. All authors have read and agreed to the published version of the manuscript.

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Availability of data and materials

The corresponding author will have access to the data that were the basis for this article.

Declarations

Ethics approval and consent to participate

The study was conducted in accordance with the Declaration of Helsinki, and the protocol was approved by the Ethics Committee of the Institute, University of Campania Luigi Vanvitelli [Protocol number: #555/2017; Date: 05/10/2017]. The study protocol was developed, and all subjects gave their

written informed consent for inclusion before they participated in the study. Informed consent was obtained from legal guardian(s) or next of kin as minors (below 16 years of age).

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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